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WHAT IS CLAIMED IS:

1. A flame arrester adapted for placement in a conduit carrying a stream of flammable atmosphere for preventing an external flame at a downstream point in said stream from flashing back in an upstream direction to the source of said flammable atmosphere, said arrester comprising a layer of nested ellipsoids contained between front and back cover screens, said ellipsoids having an internal surface area of at least  $250 \text{ ft}^2$  per  $\text{ft}^3$  and being formed from expanded metal sheets made from magnesium alloy foil containing at least 3% magnesium and having a thickness in the range from 0.05-1.0 mm.

2. A flame arrester as in claim 1 wherein said stream of flammable atmosphere is an explosive mixture of air and gas traveling through a conduit in a closed combustion system.

3. A flame arrester as in claim 1 wherein said stream of flammable atmosphere is traveling through a vent pipe of a storage tank for a flammable substance.

4. A flame arrester as in claim 1 wherein said flame is the pilot or burner light of a hot water heater and the source of said flammable atmosphere is a fugitive

mixture caused by the accidental spillage of fuel in the vicinity of said hot water heater.

5. A flame arrester as in claim 1 wherein said layer of ellipsoids is contained within a basket formed from an expanded metal net foil made from magnesium alloy.

6. A flame arrester as in claim 1 wherein the short diameter of said ellipsoid is in the range of 20 to 30 mm and the long diameter is in the range of 30 to 45 mm.

7. In a fuel tank having a vent opening for releasing fuel vapors from said tank when the vapor pressure in said tank exceeds a predetermined value, a flame arrester mounted in said vent opening for preventing an external flame from flashing back into said tank, said arrester comprising a layer of nested ellipsoids contained between front and back cover screens, said ellipsoids having an internal surface area at least as high as  $250 \text{ ft}^2$  per  $\text{ft}^3$  and being formed from expanded metal sheets made from magnesium alloy foil containing at least 3% magnesium and having a thickness in the range from 0.05 to 1.0 mm.

8. A fuel combustion system comprising a device for producing a mixture of fuel and air, a burner for burning said mixture, a pipe connecting said mixing device and

said burner for conveying said mixture to said burner, and a flame arrester mounted in said pipe for preventing flame from said burner from flashing back upstream to said mixing device, said flame arrester comprising a contained layer of nested ellipsoids contained between front and back cover screens, said ellipsoids being formed from expanded metal sheets made from magnesium alloy foil containing at least 3% magnesium and having a thickness in the range of 0.05 to 1.0 mm.

9. A gas-fired hot water heater which is fire-safed against flash-back ignition of fugitive flammable vapors accidentally occurring in the surrounding atmosphere, said heater comprising:

- (a) a cabinet,
- (b) a tank located in said cabinet,
- (c) a combustion chamber in said cabinet,
- (d) a burner mounted in said combustion chamber for heating water in said tank,
- (e) a gas-supply line leading into said burner,
- (f) openings in said cabinet for allowing air to enter said combustion chamber to mix with said natural gas and produce a flame in said burner,
- (g) and nested ellipsoids covering said openings in said cabinet for preventing said flame in said burner from flashing out of said cabinet and igniting fugitive flammable

vapors surrounding said cabinet, said ellipsoids being formed from expanded metal sheets made from magnesium alloy foil.

10. A hot water heater as in claim 9 wherein there is a burner access opening in said cabinet and a contained layer of said ellipsoids in said access opening.

11. A process for preventing a supply of flammable atmosphere from being ignited by a flame burning externally of said atmosphere, comprising the step of placing between said flame and said atmosphere a flame arrester comprising a layer of nested ellipsoids contained between front and back cover screens, said ellipsoids being formed from expanded metal sheets made from magnesium alloy foil containing at least 3% magnesium and having a thickness in the range from 0.05 to 1.0 mm.

12. A process as in claim 11 wherein said layer of ellipsoids is contained within a basket formed from an expanded metal net foil made from magnesium alloy.

13. A process as in claim 11 wherein the short diameter of said ellipsoid is in the range of 20 to 30 mm and the long diameter is in the range of 30 to 45 mm.

14. In a process for heating hot water in a tank, wherein a supply of gas is continuously introduced into a combustion chamber adjacent said tank, and a supply of air from the atmosphere surrounding said chamber is continuously introduced into said chamber through openings in said chamber to produce a flammable mixture which is burned with a flame to heat the said water in said tank, the step of placing a contained layer of nested ellipsoids in said openings in said chamber for preventing said flame in said chamber from flashing out of said chamber and igniting fugitive flammable vapors in the said atmosphere surrounding said chamber, said ellipsoids being formed from expanded metal sheets made from magnesium alloy foil.